

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NO. 50-289/94-05
LICENSE NO. DPR-50
LICENSEE: GPU Nuclear Corporation
P.O. Box 480
Middletown, PA 15057
FACILITY NAME: Three Mile Island Unit 1
INSPECTION AT: Middletown, Pennsylvania and
NRC Region I Office
INSPECTION DATES: February 7 - 11, 1994 (Site)
February 14 - 16, 1994 (Region I Office)

INSPECTOR: *H. I. Gregg* *Feb. 25, 1994*
Harold I. Gregg, Sr. Reactor Engineer
Systems Section, EB, DRS
Date

APPROVED BY: *P. K. Eapen* *2/25/94*
Dr. Plackeel K. Eapen, Chief
Systems Section, EB, DRS
Date

Areas Inspected: The licensee's root cause analysis for the leaking pressurizer safety valve and the proposed corrective actions.

Results: The licensee's plant experience report 93-004 identified that the cause for the leaking pressurizer safety valve was of misalignment. The licensee's planned actions to eliminate leakage in future occurrences appeared to be appropriate with the exception of the fact that there was no available data to demonstrate the ability of the proposed lever manipulation reseating attempts to effectively eliminate the leak. Final approved specifications, procedures, and safety evaluations were not available and test and vendor reports were not received at the time of this inspection. The leaking pressurizer safety valve was designated as an unresolved item in this report, pending licensee's completion of the proposed actions.

DETAILS

1.0 INSPECTION PURPOSE AND INTRODUCTION

The purpose of this inspection was to review the licensee's root cause analysis for a leaking pressurizer safety valve (RC-RV-1B Serial No. BL-08898, a Dresser Industries 2½" Model 31739A Maxiflow Safety Valve identified on October 14, 1994) and licensee's actions to eliminate leakage in future occurrences.

The details of the leaking valve, sequence of the events, attempts to reseal the valve, and safety implications were described in NRC Inspection Report No. 50-289/93-25. As described in the report, attempts to stop the leakage were unsuccessful and the plant was shutdown on November 14, 1994, and the valve was replaced with a spare. The removed valve was sent to Wylie Laboratories for testing, inspection, and refurbishment.

2.0 CAUSE OF PRESSURIZER SAFETY VALVE LEAKAGE

The inspector discussed the valve problem with cognizant plant personnel, examined prior test results, examined photographs of the internals of the valve that leaked, reviewed vendor manual information and reviewed the licensee's plant experience report (PER) 93-004, dated January 4, 1994.

The PER identified the basic cause of leakage as misalignment. The following items were also discussed in the PER:

- Valve was not 100% leak-tight when installed. As determined from test records, this valve was tested in 1991 and had to be refurbished four times before passing a leak test acceptance that permitted fogging on a mirror. Refurbishment required lapping of the seats and discs twice without success, then re-machining the disc holder and lapping the disc and seat again without success. On the fourth refurbishment, a new disc was installed, the disc and seat were lapped, and the recorded test leakage was "Zero-Fog."
- Bellows assembly distortion restricted disc mobility. Distortion of the bellows assembly nose was identified on valve disassembly. The contour of the stem bottom, the bellows assembly nose, the bellows assembly nose to disc contact area, and positioning of the disc and bellows assembly in the disc holder are important in order to maintain a disc rotation and tilt motion capability.
- Impact damage of the body/bonnet studs was identified on valve disassembly. The damaged studs were at 180° from the steam wear pattern found on the seat and disc.
- The RCS leak test pressure of 2285 psig was close to the manufacturer's stated 94% of set pressure good seat tightness limit (valve set pressure is 2500 psig and normal operating pressure is 2155 psig).

Based on the inspector's examination of valve internals, photographs, and review of the vendor manual details, the inspector concluded that misalignment of the disc to seat and inability of the disc to compensate were the major causes of the problem.

3.0 PLANNED ACTIONS TO PREVENT RECURRENCE

The licensee was developing the following actions to prevent recurrence or to respond to another pressurizer safety valve leakage occurrence:

- Revise test specification SP1102-12-020 and SP1101-12-103 steam leakage acceptance to "Zero-no fog."
- Affix accelerometers to the valve or shipping containers to enable determination that valve was not impacted.
- Revise pressurizer safety valve installation/removal Maintenance Procedure 1401-2.1 to include guidance on proper handling of these valves to avoid seat leakage and damage.
- Revise Surveillance Procedure 1303-8.1, RCS Review Prior to Returning to Criticality to include pressurizer safety valve leakage verification. The licensee was considering a revision to Operating Procedure 1103-5 to include reseating attempts (during the return to critically RCS review and plant in hot shutdown) by lowering pressure for a prescribed time, and to perform lever actuation reseating attempts, if leakage continues. These reseating attempts were to be performed with the valve almost fully gagged (lift restricted to 0.014"-0.028") and with the use of the manual lever or extension lever.

4.0 CONCLUSIONS

The inspector concluded that the licensee's PER 93-004, Leaking Pressurizer Safety Valve, was comprehensive and adequately discussed the probable causes for this occurrence. The licensee's intended actions to prevent recurrence appear to be appropriate with the exception of the fact that there was no documented evidence to demonstrate the ability of the proposed lever actuations to correct the leakage problem. Additionally, the vendor maintenance record of a prior refurbishment only provided a satisfactory or unsatisfactory acceptance for several items, such as disc mobility. As a result, the observed clearance measurements were not documented in the maintenance record.

Final corrective actions, changes to the specifications and procedures, and safety evaluations were in progress at the time of this inspection. The Wylie and Dresser reports on the leaking valve also had not been received. This item is unresolved pending the licensee's completion of actions described in Section 3.0, and the licensee's evaluation of the Wylie and Dresser reports (50-289/94-05-01).

5.0 REVIEW OF PREVIOUSLY IDENTIFIED NRC ITEMS

(Closed) Unresolved Item 50-289/92-04-04: Undocumented review of check valve critical velocity calculations.

The inspector reviewed the licensee's documented Design Verification V-1101-900-017 of August 8, 1992, for minimum check valve flow velocities that ensure disc stability. These calculations provided the formal documented review basis for increased testing or preventive maintenance compensatory actions for valves that did not meet the EPRI NP5479 guidance for minimum flow velocities. The inspector verified the flow velocity calculations for selected valves and found them to be performed, as required. This item is closed.

6.0 UNRESOLVED ITEMS

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. An unresolved item was discussed in Paragraph 4.0 and another was closed in paragraph 5.0 above.

7.0 EXIT MEETING

The inspector met with the licensee's representatives at the conclusion of the site inspection on February 11, 1994, to summarize the findings of this inspection. Attendees at the exit meeting are listed in Attachment 1. The licensee acknowledged the inspector's findings. On February 16, 1994, the licensee was advised that the leaking pressurizer safety valve issue was being identified as an unresolved item in this report pending completion of the actions discussed in paragraphs 3.0 and 4.0 of this report.

ATTACHMENT 1

Persons Contacted

GPU Nuclear Corporation

- * T. Basso, Manager, Plant Engineering
- * H. Crawford, Plant Analysis Manager
- * M. Fitzwater, Mechanical Engineer
- * R. Knight, Licensing Engineer
- G. Skillman, Technical Functions Site Director
- R. Warren, Nuclear Safety Engineer
- * J. Wetmore, Manager, Licensing
- * S. Wilkerson, Manager, System Engineering

U.S. Nuclear Regulatory Commission

M. Evans, Senior Resident Inspector
D. Beaulieu, Resident Inspector

- * Denotes presence at exit meeting on February 11, 1994.